HHS Public Access

Author manuscript

J Trauma Acute Care Surg. Author manuscript; available in PMC 2021 January 01.

Published in final edited form as:

J Trauma Acute Care Surg. 2020 January ; 88(1): 113–120. doi:10.1097/TA.0000000000002515.

PERCEIVED LOSS OF SOCIAL SUPPORT AFTER NON-NEUROLOGIC INJURY NEGATIVELY IMPACTS RECOVERY

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Abstract

Background—Traumatic injury is not only physically devastating, but also psychologically isolating, potentially leading to poor quality of life, depression and post-traumatic stress disorder (PTSD). Perceived social support (PSS) is associated with better outcomes in some populations. What is not known is if changes in PSS influence long-term outcomes following non-neurologic injury. We hypothesized that a single drop in PSS during recovery would be associated with worse quality of life.

Methods—This is a post-hoc analysis of a prospectively collected database that included patients ≥18 years old admitted to a Level 1 trauma center with injury severity score (ISS) of ≥10, and no traumatic brain or spinal cord injury. Demographic and injury data were collected at the initial hospital admission. Screening for depression, PTSD, and Medical Outcomes Study Short Form 36 Mental Composite Score (MCS) were obtained at the initial hospitalization, 1, 2, 4, and 12 months post-injury. The Multidimensional Scale of Perceived Social Support (MSPSS) was obtained at similar time points. Patients with high MSPSS (>5) at baseline were included and grouped by those that ever reported a score ≤ 5 (DROP), and those that remained high (STABLE). Outcomes were determined at 4 and 12 months.

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Author Contribution Statement:
BWC: literature search, study design, data analysis, data interpretation, writing, critical revision
SES: literature search, study design, data analysis, data interpretation, writing, critical revision
TMB: Study design, data collection, critical revision
BLZ: Literature search, study design, data collection, data interpretation, critical revision

COI Statement: no author involved in this study has any conflicts of interest to disclose

Presented during the Raymond H. Alexander Resident Paper Competition at the 32nd Annual Scientific Assembly of the Eastern Association for the Surgery of Trauma held from January 15-19, 2019. Austin, TX.

Results—411 patients were included with 96 meeting DROP criteria at 4mo, and 97 at 1yr. There were no differences in gender, race, or injury mechanism. DROP patients were more likely to be single (p=0.012 at 4mo, p=0.0006 at 1yr) and unemployed (p=0.016 at 4mo, and p=0.026 at 1yr) compared to STABLE patients. At 4mo and 1yr, DROP patients were more likely to have PTSD, depression, and a lower MCS (p=0.0006, p<0.0001).

Conclusion—Patients who have a drop in PSS during the first year of recovery have significantly higher odds of poor psychological outcomes. Identifying these socially frail patients provides an opportunity for intervention to positively influence an otherwise poor quality of life.

Level of Evidence—IV

Study Type—Prognostic and Epidemiological

Keywords

Quality of Life; Social Support; Post-traumatic Stress Disorder; Depression

Background

Injury is the leading cause of hospitalization and deaths for those aged 1 to 44 years old [1]. The extant literature on trauma has primarily studied predictors of short-term outcomes, such as in-hospital survival. However, studies examining the influence of injury on long-term health related quality of life (HRQOL) have more recently emerged. Injury can alter a survivor's HRQOL trajectory both directly and indirectly [2, 3]. Both major and minor injuries can lead to debilitating psychosocial disorders such as depression and post-traumatic stress disorder (PTSD) [4, 5]. These diagnoses are associated with disability, lost time at work, and an overall poor quality of life after injury [6–13].

While determining which HRQOL trajectory a patient will follow after injury is difficult to predict, there are modifiable and non-modifiable factors related to poor psychological outcomes [14]. One potentially modifiable factor related to mental health outcomes is social support. Several studies in both neurologically and non-neurologically injured patient populations report that social support can moderate psychological outcomes [5, 15–20]. One conceptual model for how perceived social support improves psychological health is that the presence of social support reduces overall stress, making patients less susceptible to depression and other poor psychological outcomes. At the same time, it is possible that people who become depressed, suffer PTSD, or experience other adverse mental health outcomes, erode the quality of their existing relationships and their perceived social support is negatively affected. Thus, the mere perception of a reduction in social support may impact psychological outcomes after injury [5, 16, 17, 20].

To address this causality dilemma, whether low perceived social support results in poor psychological outcomes or if poor psychological outcomes result in diminished perception of social support, we examined the question longitudinally. The aim of this study was to evaluate changes in perceived social support (PSS) after injury and assess how changes in PSS effect subsequent measurements of overall quality of life and mental health outcomes. We hypothesized that a decrease in PSS at a single time point in the year following injury

would result in lower mental health related-quality of life and greater likelihood of screening positive for depression and PTSD.

Methods

Patient Characteristics and Study Design

This was a post hoc analysis of a prospective cohort study that followed patients ≥18 years old admitted to an urban, academic, Level 1 trauma center with an injury severity score (ISS) of ≥10, and no traumatic brain or spinal cord injury. Patients were enrolled from January 2009 until December 2011, and follow up was completed in December 2012. Demographic and injury data were collected at the initial hospital admission which included age, gender, race, insurance status, annual income, comorbidities, injury severity and mechanism, and indicators of shock.

Outcome Variables

General HRQOL was measured utilizing the Medical Outcomes Study 36 item Short Form (SF-36) along with SF-36 physical (PCS) and mental (MCS) health composite scores. The SF-36 generates a profile of health across 8 domains that can be used to calculate the summary PCS and MCS. It has been validated and widely used to measure health related quality of life in injured patients [21, 22]. PSS was measured by a validated, patient reported survey that quantifies that individuals own perception of their social support network. This was completed in person or over the telephone at each follow up time point. The survey administered was the Multidimensional Scale of Perceived Social Support (MSPSS) [23, 24]. PTSD symptoms were measured with the PTSD Checklist, Civilian Version (PCL-C) [25], and depression symptoms were measured with the Center for Epidemiologic Studies Depression Scale (CES-D)[26]. Mental HRQOL, physical HRQOL, and psychologic outcome scales were calculated for pre-injury baseline measures at the patients' index admission, as well as post-injury measures at 1, 2, 4, and 12 months after hospital discharge.

Statistical Analysis

Patients who had high baseline PSS values (MSPSS > 5) were included in the analysis. They were grouped by those that ever reported a MSPSS score ≤ 5 (DROP), and those that remained high throughout the study period (STABLE). The patient groups were defined initially at the 4-month time point based on DROP criteria, then independently re-grouped at the 12-month time point by the same criteria. The groups were compared based on demographics, injury characteristics, markers of socioeconomic status, and potential markers of social support (i.e. relationship status) using Chi-square and Student's t-test as appropriate. Multivariable linear and logistic regression models were used to compare the trend of the MCS, and odds of positive depression screening, and positive PTSD screening between the DROP and STABLE groups at both the 4 and 12 months' time points, while controlling for age, gender, race, relationship status, employment status, education level, mechanism of injury, and presence of PTSD and/or depression at baseline. Comparison of patients lost to follow-up to those included in the study was completed on the basis of all covariates. SAS 9.4 (Cary, NC) was used to complete the analysis.

Results

Patient Characteristics and Retention

The original prospective cohort study on which this current study was based included a total of 500 enrolled patients. During the enrollment period a total of 6787 patients were admitted to the trauma center. Of those, 1937 met inclusion criteria. Of the 500 enrolled patients, a total of 411 patients were identified with high baseline MSPSS and included in the current study. Of these, 287 patients (69.8%) completed the 4-month follow up, and 249 (60.6%) patients completed the 1-year follow up. Complete tabulation of patient characteristics in each group is shown in Table 1. At the 4-month follow up, patients in the DROP group were younger (35.6 vs. 39.4 years, p=0.024), but there was no significant difference in age between groups at the one-year follow up time point. While there was no significant difference in education level between groups at 4 months, those in the DROP group at one year were significantly less likely to have education beyond the high school level (p=0.037). Significant differences at both 4 months and 1 year included a higher proportion of DROP patients that were single (p=0.026 at 4 months and p=0.002 at one year) and unemployed (p=0.020 at 4 months and p=0.003 at one year). Finally, particularly at the one-year time point, patients who met DROP criteria were more likely to have also sought treatment for depression (p=0.0012) and/or PTSD (p=0.0384) in the year since their initial trauma. There were no other significant differences in demographic or clinical characteristics between the two groups.

Outcomes

Baseline—Of the total cohort of 411 patients, 276 (67.2%) experienced a drop in PSS severe enough to meet DROP criteria at some point within the first year of follow up after trauma. When the groups were compared on the basis of reported PTSD and depression at their pre-trauma baseline, unadjusted analysis showed those in the DROP group reported lower average SF-36 MCS scores ($p = 0.020$). They were also more likely to have a higher PCL-C scores ($p < 0.001$) and flag as positive for PTSD using DSM-V criteria ($p = 0.002$). Similarly, the DROP group had higher CESD scale scores ($p < 0.001$) and screened positive for depression more frequently ($p<0.001$) when compared to patients with stable PSS (Table 2).

4-Month Follow up

Of the patients who completed the four month follow up, 96 (33.4%) patients met DROP criteria. Unadjusted analysis of outcomes revealed that DROP patients were more likely to have PTSD (39.6% vs. 21.5%, p=0.001), more likely to have depression (64.6% vs. 36.7%, p<0.001), and have a lower average MCS score (40.4 vs. 47.4, p<0.001) (Table 2). PCS did not differ between groups (31.4 vs. 32.1, p=0.646). These associations retained significance when PTSD and depression were evaluated as both binary variables (screen positive vs. negative) and as continuous variables based on PCL-C and CES-D raw scores.

After adjusting for age, gender, race, employment status, relationship status, level of education, and injury mechanism, and baseline PTSD or depression, these effects remained largely significant. Being in the DROP group remained a significant predictor of higher

PCL-C scores (p = 0.009) though the odds of screening positive for PTSD by DSM-V criteria were only marginally significant (OR 1.8, p = 0.060) for the DROP group compared to the STABLE group. Patients meeting DROP criteria had 2.9 (95% CI 1.6– 5.1) times the odds of meeting depression criteria by CESD scale compared to those in the STABLE group. They also continued to have lower MCS (p =0.001), while no difference in PCS remained between groups (p=0.385) (Table 3).

One-Year Follow Up

Of the patients who completed the one-year follow up, 97 (39.0%) patients met DROP criteria. The unadjusted outcome showed the DROP group had significantly more patients with PTSD (39.6% vs. 19.7%, p<0.001), depression (69.1% vs. 35.5%, p<0.001), and lower mean MCS (38.5 vs. 49.6, p<0.001). PCS did not differ between groups (34.8 vs. 36.8, p=0.181) (Table 2). These associations also retained significance when evaluated as both binary and continuous variables from the PCL-C and CES-D.

In the multivariable analysis, we found differences persisted between the two social support groups (Table 4). The odds ratios of PTSD and depression comparing the DROP group to the STABLE group were 2.4 (95% CI 1.2–4.8) and 2.9 (95% CI 1.6–5.1), respectively, at the one-year follow up time point. The DROP group continued to have lower MCS (p<0.001) but no difference in PCS (p=0.337) (Table 4).

Lost to Follow-Up

A comparison of patients lost to follow-up and those who completed the study is shown in Table 5. At 4-month follow up, younger age, male gender, education level, and shorter hospital length of stay (LOS) were all significantly associated with study drop out. When placed into a multivariable model to predict loss to follow up, only male gender (p < 0.001) and hospital LOS (p = 0.049) remained significant predictors. At one-year follow-up, there are similar associations with the addition of mechanism of injury and home ownership as possible predictors. Again, when placed into a multivariable model to predict loss to follow-up, only male gender (p < 0.001) and hospital LOS (p = 0.019) remained significant predictors of study drop out.

Discussion

Low PSS has been associated with increased rates of PTSD and depression as well as poor mental health after trauma [5, 15–20, 27]. In this study, we evaluated the effect of PSS loss on subsequent changes in overall mental health, incidence of PTSD, and incidence of depression after injury. Limiting the cohort to individuals who had a high level of support at baseline allowed us to evaluate the patients who should have the lowest risk for poor mental health outcomes. We found that almost 40% of patients who experienced a drop in PSS developed PTSD and 69% developed depression in the first year after their injury. Additionally, they had significantly lower overall mental health-related quality of life as evidenced by a 10 point difference in the MCS between groups. These data support the theory that PSS plays a significant role in psychosocial outcomes after injury.

Patients with high PSS have a low incidence of PTSD, low incidence of depression, and high mental health scores [6, 17]. This study focused on this group of patients. Our data show that 39.6% of patients who had a period of lower PSS screen positive for PTSD 1 year after injury. This is substantially higher than the 23% incidence of PTSD reported by Zatzick et.al in his study of nearly 3000 patients across 69 hospitals [28]. A systematic review showed similar incidence, reporting 7–26% of patients who develop PTSD after extended follow up [18]. Similarly, depression has been reported to be present in 18–31% of trauma patients in 6 to 12 months of follow up [4, 8, 9, 29]. With a period of low PSS, this incidence increases to nearly 70% at 12 months. The STABLE group mirrored the published reports for both PTSD and depression. Losing PSS within the first 4 or 12 months after injury may contribute to psychological frailty, which predisposes patients to poor mental health outcomes.

Employment status at the time of injury is another aspect of recovery that is associated with changes in mental health and HRQOL. Brenneman et. al. reported that only 52% of patients had returned to work by 12 months. This group of patients had higher SF-36 scores, and the scores improved increasingly over the follow up period [30]. Unemployment status at time of injury has also been identified as a predictor of post-injury depression [31]. Our data supports this finding and suggests that a higher proportion of patients who ultimately experience a drop in PSS are unemployed prior to their injury. What we cannot infer from our analysis whether employment status negatively affected PSS, or if the loss of PSS along with impaired functional capacity after injury led to the loss of employment. The lack (or loss) of employment may contribute to social isolation, and subsequent mental frailty, of this population leading to negative psychosocial effects.

The unique aspect of our study compared to previous work in this area is that we examined PSS as a dynamic variable rather than a static, baseline measurement. We also examined both proximal and distal outcomes after injury. A drop below the level of “good” at any time prior to the 4 months or 12 month visit resulted in a patient being assigned to the DROP group, even if they ultimately recovered to their baseline level of PSS. Capturing changes in social support and the resulting mental health outcome is a strength of our study design. Multiple assessments during the follow-up period allowed for a dynamic picture of how injured patients mentally and physically recover in the year after injury.

Traditionally, the trauma system does not provide adequate support for the recovering patient, and mental health is not often addressed as part of routine follow-up care [5]. Predicting which patients experience protracted mental health recovery or even chronic impairment remains difficult. Injury severity does not reliably predict which patients will experience psychiatric morbidity [5, 32, 33]. Recently, trajectory based modeling has identified five distinct mental health recovery patterns for trauma patients [2]. It has been suggested that frequent follow up with QOL, PTSD, and depression assessments can identify patients at risk for incomplete recovery or even increasing impairment following hospital discharge[2]. PSS could represent an early warning sign of poor mental health trajectory and could be used to guide stepped care interventions.[34–37]. The stepped care approach has been shown to improve recovery speed in patients with PTSD who otherwise would exhibit a slowly remitting trajectory [38]. Further, these interventions reduce prevalence of PTSD, depression, and anxiety, while also improving QOL and physical recovery in the year after

injury [34–37]. Resilience training is another intervention that has shown promise as proposed by Kent and colleagues. The results from their randomized study reported improved PTSD, depression, and anxiety outcomes in combat veterans [39]. Group support sessions in this previous study focused on social connectedness among other aspects of resilience. Our study adds another dimension to the screening tools and stepped care approaches currently in the literature. By screening for perceived social support, it may be possible to identify patients at risk for PTSD and depression much earlier in their post-injury course to guide interventions directed at mental health recovery.

This study had several limitations. As with all longitudinal cohort studies, loss to follow up can potentially lead to response bias. We compared injury and demographic characteristics of patients lost to follow up and those with complete data (Table 5). Indeed, there were differences. Compared to patients who completed the study, patients who were lost to follow-up tended to be younger, male victims of penetrating trauma and less likely to have finished high school. As a result, our estimates may be conservative, as violently injured patients likely experience greater psychologic morbidity [40]. Given these differences, gender, age, level of education, and mechanism of injury were controlled for in the final models at all time points.

In addition, studies examining QOL in the injured population are difficult to compare to one another due to the lack of a common measurement tool. Polinder et. al. attempted a systematic review and meta-analysis on this topic, but they were unable to perform the analysis due to excessive variability of reporting outcomes and incompatibility of QOL measures used [41]. Another consideration regarding comparability to other studies is the patient population enrolled and the follow up period. The patients in this study were from a single institution representing an urban trauma population and followed for only 1 year after injury. It is feasible that the data collected can only be applied to an urban trauma center population from the Mid-south United States. The data used for this study were from a prospective cohort that completed follow-up in 2012. While circumstances have not changed drastically in the United States since the end of follow-up in this study, it is possible that temporal changes may limit the generalizability of the results of the current study.

We categorized MSPSS scores based on the general population's normal range from prior studies [23, 24], and the MSPSS was designed to minimize the ceiling effect. It is possible that choosing a cutoff value may dilute some minor differences. The patients who agreed to participate may be fundamentally different than those who refused, leading to unaccounted differences in responses. Further, because we focused on patients who had high MSPSS at baseline we are unable to comment on patients who never had high MSPSS in the current analysis. Also, we considered a single drop in perceived social support as equal to a transient decrease or to a sustained decrease in perceived social support. It is possible that patients experience different trajectories with regard to perceptions of social support and that these trajectories might be related to patients' outcomes. Lastly, thought should be given to whether the baseline surveys of the patients in the study accurately capture pre-injury QOL. Injury itself may alter how participants recalled their health prior to hospitalization. Baseline responses using SF-36, MSPSS, PCL-civilian, and CES-D immediately after injury have been used extensively in prior studies, and seem to be representative of baseline

characteristics available for comparison purposes [2, 3, 7, 10, 11, 13, 14, 27, 30, 32, 33, 37, 42–48]. To account for the potential overestimation of baseline PTSD and depression, it was included into our regression model. The outcomes between groups were still significantly different further strengthening the observed effect from a drop in PSS.

Despite these limitations, some compelling conclusions can be drawn from this study. Previous studies indicate that higher levels of PSS are related to better QOL and less psychological sequelae after trauma. The present study extends these findings and suggests that perceived social support should be consistently high throughout the patient's recovery process in order to provide maximal benefit. Even if a patient has "good" PSS at time of injury, if they experience a loss in this support, even if it is transient, their outcomes are significantly worse. Trauma care does not end at hospital discharge, or even after first follow up visit. Utilizing PSS as a screening tool to identify psychologically frail patients should be a part of every major trauma system. Early identification of these individuals could allow opportunity for intervention to interrupt the cycle that causes these socially frail patients to slide into mental illness. One aspect of multi-faceted trauma recovery and support programs that needs to be elucidated is the optimal timing of intervention. Identifying the point after trauma where patients transition from psychosocial frailty to developing a psychiatric condition could further inform interventional program design.

Acknowledgments

Funding Statement: This project was funded by a grant from the National Institute of General Medical Science at the National Institute of Health, award number K23GM084427. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

This study was funded by National Institutes of Health. Award number K23GM084427

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Table 1.

Comparison of baseline demographics, details of initial trauma, and markers of socioeconomic status between groups experiencing stable vs. a drop in PSS at the four-month and one-year follow up time points.

	4-Month Follow Up			One-Year Follow Up		
	STABLE (n = 191)	**DROP (n = 96)**	**p-value**	**STABLE (n = 152)**	**DROP (n = 97)**	**p-value**
Age, mean(SD)	39.4 (15.1)	35.6 (12.4)	**0.0235**	40.2 (15.8)	36.6 (13.0)	0.0523
Gender, n (%)	114 (59.7)	53 (55.2)	0.4681	87 (57.2)	52 (53.6)	0.5739
Male						
Race, n (%)			0.6986			0.7904
White	100 (52.4)	48 (50.0)		85 (55.9)	50 (51.6)	
Black	89 (46.6)	48 (50.0)		65 (42.8)	47 (48.5)	
Hispanic	0 (0)	0 (0)		1 (0.66)	0 (0)	
Other	2 (1.1)	0 (0)		1 (0.66)	0 (0)	
Relationship Status			**0.0263**			**0.0018**
Current	94 (49.2)	33 (34.4)		82 (54.0)	31 (32.0)	
Previous	40 (20.9)	20 (20.8)		26 (17.1)	19 (19.6)	
Single	57 (29.8)	43 (44.8)		44 (29.0)	47 (48.5)	
Education Completed			0.2282			**0.0367**
< High School	33 (17.3)	20 (20.8)		24 (15.8)	22 (22.7)	
High School	138 (72.2)	72 (75.0)		107 (70.1)	71 (73.2)	
College	11 (5.8)	1 (1.0)		14 (9.2)	1 (1.0)	
Graduate	9 (4.7)	3 (3.1)		7 (4.6)	3 (3.1)	
Home ownership			0.6242			0.6004
Own	124 (64.9)	59 (61.5)		105 (69.1)	62 (63.9)	
Rent	57 (29.8)	34 (35.4)		37 (24.3)	31 (32.0)	
Other	7 (3.7)	3 (3.1)		7 (4.6)	3 (3.1)	
Unsure	3 (1.6)	0 (0)		3 (2.0)	1 (1.0)	
Individual income ($1000s)			0.5372			0.0773
<10	70 (36.7)	46 (47.9)		53 (34.9)	50 (51.6)	
10 to 15	24 (12.6)	11 (11.5)		18 (11.8)	12 (12.4)	
15 to 25	27 (14.1)	9 (9.4)		18 (11.8)	12 (12.4)	

	4-Month Follow Up			One-Year Follow Up		
	STABLE (n = 191)	**DROP (n = 96)**	**p-value**	**STABLE (n = 152)**	**DROP (n = 97)**	**p-value**
25 to 35	22 (11.5)	10 (10.4)		19 (12.5)	7 (7.2)	
35 to 50	17 (8.9)	5 (5.2)		16 (10.5)	4 (4.1)	
50 to 75	9 (4.7)	4 (4.2)		8 (5.3)	5 (5.1)	
>75	11 (5.8)	3 (3.1)		13 (8.6)	2 (2.1)	
Unsure	11 (5.8)	8 (8.3)		7 (4.6)	5 (5.1)	
Employment			**0.0198**			**0.0029**
Employed	152 (79.6)	62 (64.6)		124 (81.6)	61 (62.89)	
Unemployed						
<1 year	15 (7.9)	15 (15.6)		10 (6.6)	17 (17.5)	
>1 year	24 (12.6)	19 (19.8)		18 (11.84)	19 (19.6)	
Mechanism of Injury			0.1193			0.2069
Blunt	155 (84.2)	72 (76.6)		126 (86.9)	76 (80.9)	
Penetrating	29 (15.8)	22 (23.4)		19 (13.1)	18 (19.1)	
ISS, mean (SD)	20.8 (9.2)	20.5 (9.2)	0.7907	20.6 (9.0)	21.6 (9.4)	0.4133
Hospital LOS, mean (SD)	13.9 (9.2)	12.2 (8.3)	0.1443	14.1 (9.4)	13.1 (8.8)	0.4148
Discharge disposition			0.2606			0.2838
Home	145 (78.8)	80 (85.1)		114 (78.6)	80 (85.1)	
Home Health	5 (2.7)	2 (2.1)		5 (3.5)	2 (2.1)	
Rehab	33 (17.9)	10 (10.6)		26 (17.9)	11 (11.7)	
SNF	1 (0.5)	1 (1.1)		0 (0)	1 (1.0)	
Reported Treatment, n (%)						
Depression	27 (14.1)	26 (27.1)	**0.0077**	31 (20.4)	38 (39.2)	**0.0012**
PTSD	9 (4.7)	4 (4.2)	0.8340	11 (7.2)	15 (15.5)	**0.0384**

Table 2.

Unadjusted outcomes measures comparing those patients who ever experienced a drop in their PSS to those who experienced stable PSS at baseline, four-month follow up, and one-year follow up.

	Baseline (n = 411)			4-Month Follow Up (n = 287)			One-Year Follow Up (n = 249)		
	STABLE (n = 276)	**DROP (n = 135)**	**p-value**	**STABLE (n = 191)**	**DROP (n = 96)**	**p-value**	**STABLE (n = 152)**	**DROP (n = 97)**	**p-value**
SF-36 PCS, mean (SD)	52.5 (9.4)	54.3 (8.7)	0.0662	32.1 (11.0)	31.4 (8.9)	0.6462	36.8 (13.2)	34.8 (9.5)	0.1810
SF-36 MCS, mean (SD)	55.1 (7.5)	52.2 (10.9)	**0.0020**	47.4 (12.8)	40.4 (12.8)	**<0.0001**	49.6 (11.7)	38.5 (13.7)	**<0.0001**
PCL-C, mean (SD)	22.3 (8.2)	27.1 (12.8)	**<0.0001**	34.6 (16.3)	43.1 (17.3)	**<0.0001**	33.3 (14.7)	42.8 (19.0)	**<0.0001**
Met DSM-V Criteria for PTSD, n (%)	8 (2.9)	14 (10.4)	**0.0016**	41 (21.5)	38 (39.6)	**0.0014**	30 (19.7)	38 (39.6)	**0.0008**
CESD Scale, mean (SD)	5.2 (7.5)	9.7 (11.0)	**<0.0001**	14.8 (12.0)	24.0 (14.6)	**<0.0001**	13.2 (11.0)	25.7 (16.1)	**<0.0001**
Met Depression criteria, n (%)	18 (6.5)	33 (24.4)	**<0.0001**	70 (36.7)	62 (64.6)	**<0.0001**	54 (35.5)	67 (69.1)	**<0.0001**

Table 3.

Multivariable model characteristics for any drop in social support at four-month follow up as a predictive factor for the outcomes PCS, MCS, PTSD, and depression when controlling for age, gender, race, employment status, relationship status, level of education, mechanism of injury, and baseline PTSD and/or depression.

	Parameter Estimate for Social Support (DROP) Variable	Standard Error	OR (95% CI) for Binary Outcomes	Model ROC AUC	p-value
SF-36 PCS	1.162	1.334	-	-	0.3847
SF-36 MCS	5.371	1.653	-	-	**0.0013**
PCL-C Score for PTSD Screening	−5.453	2.062	-	-	**0.0087**
Met DSM-V Criteria for PTSD	0.602	0.320	1.8 (0.98– 3.4))	0.754	0.0599
CESD Scale for Depression	−7.450	1.630	-	-	**<0.0001**
Met Depression criteria	1.068	0.290	2.9 (1.6– 5.1)	0.751	**0.0003**

Table 4.

Multivariable model characteristics for any drop in social support at one-year follow up as a predictive factor for the outcomes PCS, MCS, PTSD, and depression when controlling for age, gender, race, employment status, relationship status, level of education, mechanism of injury, and baseline PTSD and/or depression.

	Parameter Estimate for Social Support (DROP) Variable	Standard Error	OR (95% CI) for Binary Outcomes	Model ROC AUC	p-value
SF-36 PCS	1.578	1.639	-	-	0.3366
SF-36 MCS	9.032	1.799	-	-	**<0.0001**
PCL-C Score for PTSD Screening	−6.395	2.354	-	-	**0.0071**
Met DSM-V Criteria for PTSD	0.8910	0.347	2.4 (1.2– 4.8)	0.734	**0.0103**
CESD Scale for Depression	−10.194	1.893	-	-	**<0.0001**
Met Depression criteria	1.076	0.3114	2.9 (1.6– 5.4)	0.733	**0.0005**

Table 5.

Comparison of baseline demographics, details of initial trauma, and markers of socioeconomic status between those patients included in the analysis at four-month and one-year follow up and those who were lost to follow-up at those time points.

	4-Month Follow Up			One-Year Follow Up		
	Included Patients (n = 287)	**Lost to Follow Up (n = 124)**	**p-value**	**Included Patients (n = 249)**	**Lost to Follow Up (n = 162)**	**p-value**
Age, mean(SD)	38.1 (14.3)	35.0 (14.1)	**0.0386**	38.8 (14.8)	34.7 (13.2)	**0.0051**
Gender, n (%)	167 (58.2)	98 (79.0)	**<0.0001**	139 (55.8)	126 (77.8)	**<0.0001**
Male						
Race, n (%)			0.2311			0.4858
White	148 (51.6)	64 (51.6)		135 (54.2)	77 (47.5)	
Black	137 (47.7)	58 (46.8)		112 (45.0)	83 (51.2)	
Hispanic	0 (0)	2 (1.6)		1 (0.4)	1 (0.6)	
Other	2 (0.7)	0 (0)		1 (0.4)	1 (0.6)	
Relationship Status			0.5909			0.1748
Current	102 (35.5)	38 (30.7)		93 (37.4)	47 (29.0)	
Previous	160 (55.8)	73 (58.9)		20 (8.0)	18 (11.1)	
Single	25 (8.7)	13 (10.5)		136 (54.6)	97 (59.9)	
Education Completed			**0.0022**			0.2290
< High School	53 (18.5)	35 (28.2)		46 (18.5)	42 (25.9)	
High School	210 (73.2)	75 (60.5)		178 (71.5)	107 (66.1)	
College	12 (4.2)	13 (10.5)		15 (6.0)	10 (6.2)	
Graduate	12 (4.2)	1 (0.8)		10 (4.0)	3 (1.9)	
Home ownership			0.9292			**0.0220**
Own	183 (63.8)	76 (61.3)		167 (67.1)	92 (56.8)	
Rent	91 (31.7)	42 (33.9)		68 (27.3)	65 (40.1)	
Other	10 (3.5)	5 (4.0)		10 (4.0)	5 (3.1)	
Unsure	3 (1.1)	1 (0.8)		4 (1.6)	0 (0)	
Individual income ($1000s)			0.4651			0.4080
<10	116 (40.4)	46 (37.1)		103 (41.4)	59 (36.4)	
10 to 15	35 (12.2)	14 (11.3)		30 (12.1)	19 (11.7)	

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	4-Month Follow Up			One-Year Follow Up		
	Included Patients (n = 287)	**Lost to Follow Up (n = 124)**	**p-value**	**Included Patients (n = 249)**	**Lost to Follow Up (n = 162)**	**p-value**
15 to 25	36 (12.5)	17 (13.7)		30 (12.1)	23 (14.2)	
25 to 35	32 (11.2)	12 (9.7)		26 (10.4)	18 (11.1)	
35 to 50	22 (7.7)	5 (4.0)		20 (8.0)	7 (4.3)	
50 to 75	13 (4.5)	11 (8.9)		13 (5.2)	11 (6.8)	
>75	14 (4.9)	10 (8.1)		15 (6.0)	9 (5.6)	
Unsure	19 (6.6)	9 (7.3)		12 (4.8)	16 (9.9)	
Employment			0.6993			0.7231
Employed	214 (74.6)	97 (78.2)		185 (74.3)	126 (77.8)	
Unemployed						
<1 year	30 (10.5)	12 (9.7)		27 (10.8)	15 (9.3)	
>1 year	43 (15.0)	15 (12.1)		37 (14.9)	21 (13.0)	
Mechanism of Injury			0.0823			**0.0017**
Blunt	227 (81.7)	88 (74.0)		202 (84.5)	113 (71.5)	
Penetrating	51 (18.4)	31 (26.0)		37 (15.5)	45 (28.5)	
ISS, mean (SD)	20.7 (9.2)	20.0 (9.8)	0.5103	21.0 (9.1)	19.7 (9.6)	0.1883
Hospital LOS, mean (SD)	13.3 (8.9)	11.4 (7.9)	**0.0491**	13.7 (9.1)	11.2 (7.7)	**0.0045**
Discharge disposition			0.1143			**0.0266**
Home	225 (80.9)	105 (88.2)		194 (81.2)	136 (86.1)	
Home Health	7 (2.5)	1 (0.8)		7 (2.9)	1 (0.6)	
Rehab	43 (15.5)	10 (8.4)		37 (15.5)	16 (10.1)	
SNF	2 (0.7)	1 (0.8)		1 (0.4)	2 (1.3)	